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**ECHINODERMS COLLECTED OFF THE WEST COAST OF GREENLAND BY  
THE PRINCETON ARCTIC EXPEDITION OF 1899.**

BY WALTER M. RANKIN.

The following Echinoderms were collected by the Princeton Arctic Expedition of 1899.

In compiling the list I have endeavored to give, in addition to the identification of the species, some notes on the specimens—their number, locality and peculiarities, together with a tabulation of the distribution of the species in area and depth.

I have not attempted to give a complete synonymy of the species, but merely to quote the original author and, ordinarily, the reference where a more complete description or figure of the species may be found.

**HOLOTHURIOIDEA.**

**1. *Cucumaria frondosa* (Gunn.).**

*Holothuria frondosa* Gunnerus, Abhand. der Kgl. Schwed. Akad. der Wissenschaften, p. 115, Pl. IV, figs. 1, 2, 1767.

*Cucumaria frondosa* Forbes, History of British Starfishes, p. 209, 1841.

Station 49. Oliks Bay, upper narrows, 15–20 fathoms. 1 specimen.

A single small specimen, 47 mm. long, 34 mm. in diameter as contracted in alcohol. One tentacle, the ventral, is dark colored; the others light.

*Distribution.*—Florida reefs (dredged), Massachusetts to Labrador, Baffin's Bay (Nares Ex.), Assistance Bay (Penny's voyage), Iceland, North Cape, Spitzbergen, Kara Sea, north coast of Alaska. "The form discovered by Ayres at San Francisco may perhaps be *C. californica*, a closely allied species" (Ludwig).

Ludwig, in *Fauna Arctica*, Bd. 1, pp. 142, 143 (1900), gives the distribution as a two-thirds circumpolar, the species being still unrepresented in the north Asian region, from 70° E. L. to 170° W. L. North and south its extreme points of distribution are,

Florida reefs, 24° N. L. on the west, and Plymouth, England, 50° N. L. on the east of the Atlantic, to Spitzbergen, 80° N. L.

Its vertical distribution ranges from 0 to 220 fathoms on the west coast of Iceland. The usual depth is from 3 to 30 fathoms.

**2. *Myriotrochus rinkii*** Steenstrup.

*Myriotrochus rinkii* Steenstrup, Videnskabelige Meddelelser Naturhist. Forening i Kjöbenhavn, pp. 55-60, Pl. III, figs. 7-10, 1851; Theel, Challenger Reports, Zoology, Vol. XIV, Holothuria, p. 37, 1886.

Station 9 Saunders Island, 5-10 fathoms. 1 specimen.

Station 45. Barden Bay, 10-45 fathoms. 32 specimens.

*Distribution*.—West coast of Greenland to Discovery Bay (Nares Ex.), Assistance Bay (Penny's voyage); east coast of Greenland, Spitzbergen, Barents Sea, Nova Zembla, Kara Sea, Bering Sea, Point Barrow.

As *Cucumaria frondosa*, this also is a two-thirds circumpolar form, being absent in the north Asian region, 71° E. L. to 170° W. L., and in the North American, 156° W. L. to 95° W. L.

It is a strictly Arctic form, its extreme points of distribution north and south being 81° 41' N. (Discovery Bay) to 57° N. (Skager Rak).

It belongs principally to the littoral region, but has been dredged at a depth of 360 fathoms.

### ECHINOIDEA.

**3. *Strongylocentrotus dröbachiensis*** (O. F. Müller).

*Echinus dröbachiensis* O. F. Müller, Zool. Dan. Prodr., p. 235, 1776.  
*Strongylocentrotus dröbachiensis* A. Agassiz, Revision of the Echini, Ill. Cat. Mus. Comp. Zool. Cambridge, pp. 162-267, 1872.

Station 17. Payer Harbor, Cape Sabine, 16 fathoms. 2 specimens.

Station 26. South of Cape Alexander, 27 fathoms. 2 specimens.

Station 29. Olriks Bay, lower narrows, 7-25 fathoms. 7 specimens.

Station 34. Cape York, 10 fathoms. 3 specimens.

Station 39. Granville Bay, 30-40 fathoms. 8 specimens.

Station 49. Olriks Bay, upper narrows, 15-20 fathoms. 1 specimen.

Station 50. Karnah, 30-40 fathoms. 11 specimens.

Station 51. Robertson Bay, 35-40 fathoms. 30 specimens.

Station 52. Robertson Bay, 5–15 fathoms. 4 specimens.

Station 61. Battle Harbor, Labrador, 1 fathom. 33 specimens.

The series of 101 specimens, ranging from 5 mm. to 58 mm. in diameter, shows considerable variation among themselves and from the typical form, as has been noted by Duncan and Sladen in their report on the Echinoderms of the Nares Expedition.<sup>1</sup> The height in two specimens of approximately the same diameter may differ by as much as 10 mm.—as 55 : 35 and 52 : 25 mm.

The specimens on the whole are more depressed than specimens of similar size collected on the Massachusetts coast, and the spines are shorter and less numerous, the cleaned test showing only comparatively few large tubercles.

*Distribution*.—Numerous stations on the west coast of Greenland: Discovery Bay (Nares Ex.), Assistance Bay (Penny's voyage); Great Britain, Scandinavia, Spitzbergen, Nova Zembla, north coast of Siberia, Ochotsk Sea, Kamschatka, Bering Strait.

An Arctic and Sub-Arctic form, extending as far south on the North American coast as off Chesapeake Bay. A circumpolar form, being found both in the north Atlantic and north Pacific. Its extreme depth is given by Verrill as 640 fathoms.

#### ASTEROIDEA.

##### 4. *Asterias polaris* (M. and T.).

*Asteracanthion polaris* Müller and Troschel, System der Asteriden, p. 16, 1842.

*Asterias polaris* Verrill, Proc. Boston Society Natural History, X, p. 356, 1866.

Station 1. Domino Run, Labrador, 1 fathom. 4 specimens (3 dry).

Station 2. Godhavn, Disco Island, 8 fathoms. 2 specimens (juventi).

Station 61. Battle Harbor, Labrador, 1 fathom. 12 specimens (4 dry).

A six-armed species. The size of the sixteen adult specimens averages from 160–200 mm. in total diameter. The smallest of the young specimens has a radius of 10 mm. Four of its six arms are in the form of buds.

*Distribution*.—Greenland, Torske Beach, and at 65° N.,

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<sup>1</sup> *Annals of Natural History* (IV), Vol. XX, p. 452, 1877.

twenty-six miles from the coast, at a depth of 30 fathoms (Nares Ex.); Labrador, Gulf of St. Lawrence.

5. *Asterias grønlandica* (Lütken).

*Asteracanthion grønlandica* Lütken, Vid. Meddel. N. Forening i Kjöbenhavn, p. 29, 1857.

*Asterias grønlandica* Stimpson, Proc. Acad. Nat. Sci. Phila., p. 142, 1863.

Station 9. Saunders Island, 5-10 fathoms. 5 specimens (2 juv.).

Station 11. Northumberland Island, 10-15 fathoms. 11 specimens.

Station 21. Murchison Sound, 25 fathoms. 1 specimen.

Station 27. Off Cape Chalon, 35 fathoms. 2 specimens.

Station 29. Olriks Bay, lower narrows, 7-25 fathoms. 1 specimen.

Station 32. Foulke Fjord, 14 fathoms. 1 specimen.

Station 40. Granville Bay, 20-30 fathoms. 3 specimens.

Station 50. Karnah, 30-40 fathoms. 1 specimen.

Station 51. Robertson Bay, 35-40 fathoms. 2 specimens.

Station 52. Robertson Bay, 5-15 fathoms. 7 specimens (2 juv.).

The largest of this five-armed species has a radius of 37 mm. Among those from Stations 9 and 52 are very young forms, the smallest measuring only 5 mm. in total diameter.

*Distribution*.—West coast of Greenland and extending north to Discovery and Assistance Bays, Labrador, Gulf of St. Lawrence, Grand Manan, Spitzbergen and Nova Zembla.<sup>2</sup>

6. *Asterias gunneri* Danielssen and Koren.

*Asterias gunneri* Danielssen and Koren, Den Norske Nordhavs-Expedition, Asteroidea, p. 7, Pls. II, III, figs. 8, 9, 1884.

Station 49. Olriks Bay, upper narrows, 15-20 fathoms. 1 specimen.

This single fine specimen corresponds very closely to the description given by Danielssen and Koren. The size is slightly larger than the type, diam. 360:330 mm., diam. of disk 54:52 mm. There are some minor differences, as follows: The five rows of spines on aboral surface of the rays are not so regularly arranged and the middle ones are not higher than the lateral. At the sides of

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<sup>2</sup> *Challenger Report*.

the rays the spines seem to be less regular in their arrangement; both the dorso- and ventral-laterals are about thirty in number. The rectiform pedicellariæ are similar to the type (*l. c.*, Pl. II, figs. 3 and 4). Those near the dorsal spines are smaller than those round the lateral. The cruciform pedicellariæ, however, seem to differ, being somewhat longer than in the type, and the jaws more convex on their outer surfaces. At the biting tip are two very large, sharp teeth and smaller, scattered teeth are on the concave surface. These cruciform pedicellariæ form very prominent clusters around the two lateral rows of spines.

The species was found originally by its authors in Advent Bay, Spitzbergen, at a depth of 60 fathoms, and they also report two specimens from the Kara Sea as a variety of *A. gunneri*.

This is the first recorded specimen from Greenland waters. The color in the living state corresponds, Dr. Ortmann tells me, to the description given by Danielssen and Koren, "deep red on the aboral surface, whity-yellow on the oral surface." The present alcoholic specimen is yellowish-brown.

7. *Stichaster albulus* (Stimpson).

*Asteracanthion albulus* Stimpson, Synopsis Marine Invertebrates of Grand Manan, p. 14, Pl. XIV, fig. 5, 1853.

*Stichaster albulus* Verrill, Proc. Boston. Soc. Nat. Hist., X, p. 351, 1866.

Station 4. Upernavik, 8-10 fathoms. 2 specimens.

Station 9. Saunders Island, 5-10 fathoms. 4 specimens.

Station 11. Northumberland Island, 10-15 fathoms. 5 specimens.

Station 18. Foulke Fjord, 15-20 fathoms. 10 specimens.

Station 29. Olriks Bay, lower narrows, 7-25 fathoms. 3 specimens.

Station 40. Granville Bay, 20-30 fathoms. 1 specimen.

Station 50. Karnah, 30-40 fathoms. 2 specimens.

All the specimens have the characteristic three short and three long arms. Largest specimen: radius of long arm 24.5 mm., of short arm 5.5 mm.

*Distribution.*—Eastport, Me., and Grand Manan; south of Halifax, 85 fathoms;<sup>3</sup> Greenland, Godhavn and Holsteinborg (Valorous Ex.), Port Foulke (Hayes Ex.), Franklin Pierce Bay (Nares Ex.), Iceland, Spitzbergen, Nova Zembla.

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<sup>3</sup> *Challenger Report*.

An Arctic and Sub-Arctic species. Range, from 3 to 192 fathoms.

8. *Cribrella oculata* (Linck).

*Pentadactylogaster oculatus* Linck, De Stellis Marinis, p. 35, Pl. XXXVI, No. 62, 1773.

*Cribrella oculata* Forbes, Hist. Brit. Starfishes, p. 100, 1841.

*Cribrella sanguinolenta* Lütken, Vid. Meddel. N. Forening i Kjöbenhavn, p. 31, 1857.

Station 27. Off Cape Chalon, 35 fathoms. 1 specimen.

Station 39. Granville Bay, 30–40 fathoms. 1 specimen (dry).

Station 45. Barden Bay, 10–40 fathoms. 2 specimens.

Station 49. Olriks Bay, upper narrows, 15–20 fathoms. 2 specimens.

The specimens are small (from 17 to 45 mm. in diameter), except the two from Station 45. These are 120 mm. in diameter, and in addition to their size vary from the other specimens in the greater length of the spines, the marked openness of the mesh of the aboral surface, and the irregular arrangement of the spines on the oral surface of the rays. In all these points, however, the specimens closely resemble examples from Eastport, Me., which I have examined in the Peabody Museum at New Haven.

*Distribution*.—A widely distributed Arctic and Sub-Arctic species. (?) Circumpolar.

From Nantucket shoals north, Labrador, Hall Island, Greenland (Valorous Ex.), Iceland, British coasts, Scandinavia, Spitzbergen, Nova Zembla, White Sea, off north coast of Asia (Brandt), Java (von Martens).

9. *Crossaster papposus* (Linck).

*Triskaidecactis papposa* Linck, De Stellis Marinis, p. 43, 1773.

*Crossaster papposus* Müller and Troschel, System der Asteriden, p. 26, 1842.

*Crossaster papposus* Sladen, Challenger Reports, Asteroidea, p. 444, 1889.

*Solaster papposa* Forbes, British Starfishes, p. 112, 1841.

*Solaster papposa* Danielssen and Koren, Den Norske Nordhavs-Expedition, Asteroidea, p. 48, 1884.

Station 39. Granville Bay, 30–40 fathoms. 3 specimens.

Station 49. Olriks Bay, upper narrows, 15–20 fathoms. 2 specimens.

Of the specimens collected all are 10-rayed, thus differing from the typical form which has 11–13 rays.

The two specimens from Station 49 have an extreme diameter of

80 and 68 mm. respectively, and the proportion of the radii is as two to one. The rays are broader at the base and more tapering than the typical form. As to the adambulacral armature, there are five or six spines in each plate of the longitudinal series and six in the transverse; the former are somewhat webbed at the base.

From Station 39 one specimen resembles very closely the larger one from Station 49. The other two (60 and 80 mm. in diameter respectively) have longer, more slender and less tapering rays; in this respect coming closer to the typical *C. papposus*, the proportions of the radii being about  $2\frac{1}{4}$ - $2\frac{1}{2}$  to 1. The longitudinal series of adambulacral plates have each three or four spines to a plate, and the transverse series five spines. In all five specimens the paxillæ have longer, more numerous and more divergent spines than does the typical form.

Danielssen and Koren (*l. c.*, p. 44) discuss the relation of *Solaster affinis* (Brandt) to *Crossaster* (*Solaster*) *papposus*, and Sladen (*l. c.*, p. 44) describes a form from the Farøe Islands which he calls variety *septentrionalis* of *C. papposus*, while Duncan and Sladen, in the report of the Echinoderms of the Nares Expedition,<sup>4</sup> mention the variations from the type form in their specimens of *C. papposus*. The present specimens agree with these cited descriptions in the number of the rays (10), but otherwise there are minor deviations from them all. I am inclined to think that all are merely local varieties of an extremely variable species.

*Distribution*.—Widely distributed over the whole north area of the Atlantic; Arctic and Sub-Arctic: Massachusetts, Newfoundland, Discovery Bay and Franklin Pierce Bay (Nares Ex.), Assistance Bay (Penny's voyage), Iceland, British and north French coasts, Farøe Islands, Scandinavia, Finmark, Murman coast, Spitzbergen, Barents Sea, Nova Zembla. (?) Bering Straits (*C. affinis* Brandt).

**10. *Solaster endeca* (Retzius).**

*Asterias endeca* Retzius, K. Vet. Akad. Handl. Stockholm, IV, p. 237, 1783.

*Solaster endeca* Forbes, Mem. Werner Soc., VIII, p. 121, 1839.

Station 39. Granville Bay, 30-40 fathoms. 1 specimen.

A single nine-rayed specimen, diameter 30 mm.

*Distribution*.—North coast of North America, Greenland (dredged at 30 fathoms) (Nares Ex), Iceland, coast of Great

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<sup>4</sup>*Annals of Nat. Hist.* (4), XX, p. 457, 1877.



Britain, Farøe Islands, Norway, Spitzbergen, Murman coast. A variety, *decemradiata*, with ten rays at Sitka (Brandt).

11. *Pteraster militaris* (O. F. Müller).

*Asterias militaris* O. F. Müller, Zool. Dan. Prodr., p. 234, 1776.

*Pteraster militaris* Müller and Troschel, Syst. der Asteroid., Suppl., p. 28, 1842.

Station 39. Granville Bay, 30–40 fathoms. 1 specimen.

Station 50. Karnah, 30–40 fathoms. 2 specimens.

The specimen from Granville Bay has R. 23, r. 10. The other two specimens are badly damaged.

*Distribution*.—North American coast, Bay of Fundy and south to Cape Cod, west coast of Greenland, Dobbin Bay (Nares Ex.), Davis Strait (Valorous Ex.), Smith Sound, British coast, Norway Finmark, Spitzbergen, Nova Zembla, Kara Sea.

#### OPHIUROIDEA.

12. *Ophioglypha sarsii* (Lütken).

*Ophiura sarsii* Lütken, Vid. Meddel. N. Forening i Kjöbenhavn, p. 7, 1854.

*Ophioglypha sarsii* Lyman, Ill. Cat. Mus. Comp. Zool. Cambridge, No. 1, p. 41, figs. 2, 3, 1865.

Station 39. Granville Bay, 30–40 fathoms. 1 specimen.

Station 40. Granville Bay, 20–30 fathoms. 1 specimen.

Station 45. Barden Bay, 10–40 fathoms. 1 specimen.

Station 49. Olriks Bay, upper narrows, 15–20 fathoms. 3 specimens.

Station 50. Karnah, 30–40 fathoms. 1 specimen.

Station 51. Robertson Bay, 35–40 fathoms. 1 specimen.

The specimens range in size from 20 to 30 mm. disk-diameter.

*Distribution*.—Arctic and Sub-Arctic, Circumpolar (Ludwig): coast of Maine, Massachusetts Bay and off Martha's Vineyard, Greenland, Discovery Bay and Hayes Point (Nares Ex.), coast of Norway, Spitzbergen, Franz Josef Land, Kara Sea, Barents Sea. Range in depth, 5–2941 meters (Ludwig).

13. *Ophioglypha robusta* (Ayres).

*Ophiopsis robusta* Ayres, Proc. Boston Soc. Nat. Hist., IV, p. 134, 1851.

*Ophioglypha robusta* Lyman, Ill. Cat. Mus. Comp. Zool. Cambridge, No. 1, p. 45, 1865.

*Ophiura squamosa* Lütken, Vid. Meddel., etc., p. 6, November, 1854.

Station 11. Northumberland Island, 10–15 fathoms. 1 specimen.

Station 12. Foulke Fjord, 35 fathoms. 2 specimens.

Station 18. Foulke Fjord, 15–20 fathoms. 1 specimen.

Station 21. Murchison Sound, 25 fathoms. 3 specimens.

Station 27. Off Cape Chalon, 35 fathoms. 6 specimens.

Station 29. Olriks Bay, lower narrows, 7–25 fathoms. 3 specimens.

Station 45. Barden Bay, 10–40 fathoms. 3 specimens.

Station 51. Robertson Bay, 35–40 fathoms. 2 specimens.

Station 52. Robertson Bay, 5–15 fathoms. 5 specimens.

The specimens vary in size from 5.5 mm. to 11 mm. disk-diameter. In alcohol they have a blue-gray color. Arms are usually marked with lighter transverse bars. According to Lyman's description the side arm-plates do not meet above until about the middle of the arm. I find that in the smaller specimens the side arm-plates meet nearer the disk—at about the fifth to tenth dorsal arm-plate.

*Distribution.*—Arctic and Sub-Arctic, Circumpolar (Ludwig): North American coast as far south as Cape Cod, Greenland, Discovery and Franklin Pierce Bays (Nares Ex.), Godhavn and Port Foulke (Hayes Ex.); Assistance Bay, *O. fasciculata* (Penny's voyage); Wellington Channel, north of England, Farøe Islands, European Arctic Ocean.

Range in depth, 5 to 18 meters.

14. *Ophiocten sericeum* (Forbes).

*Ophiura sericea* Forbes, Sutherland's Jour. Voyage Baffin's Bay, Vol. II, App., p. cxxv, 1852.

*Ophiocten sericeum* Ljungman, Tilläg. Skan. Oph. öf Kong. Akad., p. 360, 1864.

*Ophiocten krøyeri* Lütken, Lyman, Ill. Cat. Mus. Comp. Zool., No. 1, p. 53, 1865.

Station 12. Foulke Fjord, 35 fathoms. 12 specimens.

Station 18. Foulke Fjord, 15–20 fathoms. 3 specimens.

Station 21. Murchison Sound, 25 fathoms. 2 specimens.

Station 27. Off Cape Chalon, 35 fathoms. 4 specimens.

Station 34. Cape York, 10 fathoms. 4 specimens.

Station 39. Granville Bay, 30–40 fathoms. 199 specimens.

Station 40. Granville Bay, 20–30 fathoms. 53 specimens.

Station 43. Barden Bay, 20–25 fathoms. 2 specimens.

Station 45. Barden Bay, 10–40 fathoms. 10 specimens.

Station 49. Olriks Bay, upper narrows, 15–20 fathoms. 181 specimens.

Station 50. Karnah, 30–40 fathoms. 30 specimens.

Station 51. Robertson Bay, 35–40 fathoms. 20 specimens.

Station 52. Robertson Bay, 5–15 fathoms. 53 specimens.

This was by far the most numerous Ophiurid found by the expedition, and indeed one of the most common forms brought up by the dredge or trawl. The series contains individuals ranging in size from 2 mm. (Station 34) to 15 mm. (Station 45), disk-diameter.

*Distribution.*—Arctic and Sub-Arctic: coast of Massachusetts, northeast Atlantic (1,207 to 2,435 fathoms, Porcupine Ex.), Greenland, Discovery Bay, Hayes Point, Franklin Pierce Bay (Nares Ex.), Assistance Bay (Penny's voyage), Iceland, Jan Mayen Island, Farøe Channel, Lofoten Islands, Spitzbergen, Nova Zembla, Kara Sea. Range in depth, 5–4,453 meters (Ludwig).

**15. *Ophiopholis aculeata* Gray.**

*Ophiopholis aculeata* Gray, Radiate Animals of the British Museum, p. 25, 1848.

*Ophiopholis bellis* Lyman, Ill. Cat. Mus. Comp. Zool., I, p. 96, Pl. I, figs. 4–6, 1865.

Station 60. Battle Harbor, Labrador, 12–14 fathoms. 1 specimen.

This widely distributed species is represented by a single small specimen (3.5 mm. disk-diameter), and thus not strictly among the Greenland collections.

*Distribution.*—Arctic and Sub-Arctic, Circumpolar: North American coast as far south as Cape Hatteras, Greenland (Nares Ex., lat. 65°), Godhavn (Hayes Ex.), British coasts, Farøe Islands, Iceland, Jan Mayen Island, Spitzbergen, Kara Sea, Bering Straits.

Range in depth, 0 to 1,829 meters (Ludwig).

**16. *Amphiura sundevalli* (Müller and Troschel).**

*Ophiotelepis sundevalli* Müller and Troschel, Syst. der Asteriden, p. 93, 1842.

*Amphiura sundevalli* Ljungman, Oph. Viventia öf K. Akad. p. 320, 1866.

*Amphiura holböli* Lütken, Vid. Meddel., November, 1854, p. 98.

*Amphiura holböli* Lyman, Ill. Cat., etc., p. 118, 1865.

Station 27. Off Cape Chalon, 35 fathoms. 1 specimen.

Station 45. Barden Bay, 10–40 fathoms. 4 specimens.

The disk-diameter of these specimens is from 8 to 9 mm.

*Distribution*.—Arctic and Sub-Arctic, Circumpolar: European and Arctic seas, Greenland, Franklin Pierce Bay (Nares Ex.).

Range in depth, 5 to 201 meters (Ludwig).

17. *Ophiacantha bidentata* (Retzius).

*Asterias bidentata* Retzius, Dissertatio, p. 33, 1805.

*Ophiacantha spinulosa* Müll. and Trosch., Syst. Aster., p. 107, 1842.

*Ophiacantha bidentata* Ljungman, Oph. Vivent. öf K. Akad., p. 652, 1871.

Station 12. Foulke Fjord, 35 fathoms. 1 specimen.

Station 26. South of Cape Alexander, 27 fathoms. 2 specimens.

Station 27. Off Cape Chalon, 35 fathoms. 4 specimens.

Station 29. Olriks Bay, lower narrows, 7–25 fathoms. 2 specimens.

Station 39. Granville Bay, 30–40 fathoms. 23 specimens.

The specimens vary in size from 6 to 15 mm. disk-diameter.

*Distribution*.—Arctic and Sub-Arctic: Eastport, Me.; Grand Manan, Newfoundland; Greenland (Nares Expedition). Discovery and Franklin Pierce Bays and Cape Fraser—the most numerous Ophiurian collected by that expedition. (Duncan and Sladen consider the *Ophiura fragilis* of the Parry Expedition to be this species); Penny's voyage—Assistance Bay, *Ophiocoma echinulata*; Iceland, Farøe Channel, coast of Norway from Lofoten Islands to North Cape, Spitzbergen, Barents Sea, Kara Sea. Dredged by "Albatross" at 1,606 fathoms (2,890 meters) off the coast of North Carolina, and by the "Challenger" at 1,350 fathoms, lat. 40° 17' N., long. 66° 48' W.

The reported finding by Pfeffer of this specis in Bering Strait is considered by Ludwig to be doubtful.

#### CRINOIDEA.

18. *Antedon eschrichti* (Müller).

*Alecto eschrichti* Müller, Monatsbericht. d. k. preuss. Akad. d. Wiss., Berlin, p. 183, 1841.

*Antedon eschrichti*. See Carpenter, in Challenger Report Zool., Vol. XXVI, p. 138, for synonymy.

Station 26. South of Cape Alexander, 27 fathoms. 1 specimen.

Station 27. Off Cape Chalon, 35 fathoms. 2 specimens.

Station 29. Olriks Bay, lower narrows, 7–25 fathoms. 1 specimen.

Station 39. Granville Bay, 30–40 fathoms. 2 specimens.

Station 40. Granville Bay, 20–30 fathoms. 3 specimens.

Station 49. Olriks Bay, upper narrows, 15–20 fathoms.  
1 specimen.

Station 51. Robertson Bay, 35–40 fathoms. 6 specimens.

19. *Antedon quadrata* Carpenter.

*Antedon quadrata* Carpenter, Challenger Report Zool., Vol. XXVI, p. 149, 1888.

*Antedon celtica* Duncan and Sladen, Memoir Arctic Echinoderms, London, 1881, p. 75, Pl. VI.

Station 39. Granville Bay, 30–40 fathoms. 3 specimens.

Station 40. Granville Bay, 20–30 fathoms. 2 specimens.

Carpenter (*l. c.*, *supra*, pp. 136ff.) discusses at length the species of *Antedon* belonging to the *Eschrichti* group of Comatulæ, and gives a complete synonymy of the two species, *eschrichti* and *quadrata*. I find the differences in the material collected by this expedition to be very slight; but there are five specimens from Granville Bay which seem to belong to Carpenter's *quadrata*. Dr. Ortmann tells me that in life there is a distinct difference in their appearance, but this is less evident in the alcoholic material. The color of *quadrata* is lighter and the arms have a less feathery appearance, due to the slightly greater length of the arm-joints and the consequently greater distance between the pinnules. The character, however, of *quadrata* to which Carpenter gives special weight—*i. e.*, the shorter third pinnule as compared with the second—I cannot find at all well marked, though its joints seem, as Carpenter says, to be slightly longer than those of the same pinnule in *eschrichti*.

According to Carpenter the two species are widely distributed through the Arctic Ocean. *Eschrichti* reaches, in Smith's Sound, 79° N. lat., and *quadrata*, 81°.

Both were obtained by the Challenger Expedition as far south as off Halifax, at a depth of 51 fathoms. *Eschrichti* was found by the "Vega" as far east as long. 92° 20' E.

In depth *eschrichti* has been dredged from 632 fathoms, *quadrata* from 466 fathoms.

The Nares Expedition reports both from Discovery Bay, and other localities are, for *eschrichti*, Davis Strait, Melville Bay, Spitzbergen, and coast of Siberia; for *quadrata*, Barents Sea and Kara Sea.

Of these nineteen species it will be observed that two, *Asterias polaris* and *Ophiopholis aculeata*, are not strictly to be reckoned with the others as they were collected in more southern stations—the former off the coast of Labrador and off Disco, the latter in Battle Harbor, Labrador. The other species are all from between lat. 76° and 79° N., though some species were also found at the more southern stations.

The Arctic Echinoderm fauna has been examined with care, and it was hardly to be expected that any new species would be added to the list of those already known. It is interesting, however, to note at least a new distribution, for *Asterias gunneri* has before this, I believe, never been recorded from Greenland waters.

A comparison is naturally suggested between this list and that of the collection made by Capt. Nares, of the “Alert” and “Discovery,” in 1875–6 from the same region, and published by Duncan and Sladen in the *Annals of Natural History* (IV), Vol. XX, 1877.

We have in addition to that list one Holothurid, *M. rinkii*, and two Asterids, *Asterias gunneri* and *Cribrella oculata*; while in the Princeton collection *Asteracanthion* (*Pedicellaster*) *palæocrystallus*, *Solaster forcifer*, *Ophioglypha struwitzii* and *Astrophyton arcticum* (a deep-water form) of the Nares collection are not represented.

Of the nineteen species in the Princeton collection, all but *Asterias polaris* are more or less widely distributed in both American and European Arctic seas.

Increased knowledge of the distribution of Arctic Echinoderms seems to increase the probability that they are nearly all circum-polar and not confined to local areas.